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# The Concurrent Validity of the Shipley-2 and the WAIS-IV

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# THE CONCURRENT VALIDITY OF THE SHIPLEY-2 AND THE WAIS-IV

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**JOHN K. LODGE, PSY.M.**

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**REQUIREMENTS FOR THE DEGREE**
**OF**
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I HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER MY SUPERVISION BY **JOHN K. LODGE, PSY.M.** ENTITLED **THE CONCURRENT VALIDITY OF THE SHIPLEY-2 AND THE WAIS-IV** BE ACCEPTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PSYCHOLOGY.

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## Abstract

The recently developed Shipley-2 was compared to the Wechsler Adult Intelligence Scale, 4th edition (WAIS-IV) in order to determine the former's level of concurrent validity as a test of intellectual ability. A convenience sample of 25 clinical subjects were administered both measures at two participating outpatient clinics, and the sum results of this testing were tabulated and then correlated through the use of a statistical software package. Results showed very strong levels of correlation between the five Shipley-2 scores (Vocabulary, Abstraction, Block Patterns, Composite A, and Composite B) and the Full Scale IQ (FSIQ) of the WAIS-IV ($r$ = .549 to .807, p = .01), as well as moderate to strong correlations between the Shipley-2 scale scores and the Index scores from the WAIS-IV. More varied levels of correlation were detected between the WAIS-IV subtests and the various scores from the Shipley-2. These results suggest that the Shipley-2 can be effectively used as a screening tool or quick measure of intellectual ability among an outpatient clinical population or within similar mental health settings. However, a larger and more comprehensive analysis is needed in order to determine the full range of the new Shipley's applicability as a measure of intellectual functioning.



*Keywords:* adult outpatients, concurrent validity, intellectual functioning assessment, Shipley-2, undergraduate students, WAIS-IV

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## Dedication

To my father, from whom I gain my inquisitive spirit and thirst for knowledge;

To my mother, from whom I gain my creativity and imagination, and who has always been a faithful source of support;

To my committee members, who all have been mentors and sources of guidance through my journey into the world of clinical psychology;

To the supervisors at the Duke E. Ellis Human Development Institute and Wright State University Office of Disability Services, who generously allowed me access to their providers and clientele so that I might conduct the study recorded in this manuscript;

To the many psychology trainees, interns, and fellow students who contributed to this study through their daily work in the realm of psychological assessment.

**The Concurrent Validity of the Shipley-2 and the WAIS-IV**

The Shipley Institute of Living Scale (Shipley, 1940) has been a mainstay of cognitive assessment since its introduction over 70 years ago. Originally known as the Shipley-Hartford Scale, the Shipley was primarily designed as a brief measure of cognitive deterioration, but over time had been adapted for use as a quick measure of general intellectual functioning in a wide variety of clinical settings. Within recent years, however, the Shipley had fallen into lesser use due to a lack of updating to keep the scale current and applicable. Even though the normative sample for the Shipley was increased (Paulson & Lin, 1970), a WAIS and WAIS-R Full Scale IQ predictor added to give the scale greater versatility (Zachary, Paulson & Gorsuch, 1985), and age-adjusted norms calculated for ease of administration (Shipley & Zachary, 1986), the lack of a comprehensive overhaul meant that the scale remained a niche measure within the realm of brief assessment. However, in 2009, a new, completely revised and restandardized version of the measure, called the Shipley-2, was finally released. Since this new version's publication, little research has been conducted on its validity and applicability to various settings outside of the original standardization testing. In particular, the validity of this measure in its common use as a measure of cognitive functioning has not been fully established, as it has not been compared to the current standard bearer of intellectual assessment, the Wechsler Adult Intelligence Scale, 4$^{th}$ edition (WAIS-IV).

**Statement of Problem**

To further assess the validity of the new Shipley-2, this study sought to evaluate how well it compares to the current mainstay of cognitive and intellectual assessment, the Wechsler Adult Intelligence Scale, 4th edition (WAIS-IV). More specifically, this study assessed the concurrent validity of the Shipley-2 scale scores and composite scores against the Index scores and Full Scale IQ score of the WAIS-IV.

**Review of Related Literature**

Originally introduced as the Shipley-Hartford scale in 1940, the Shipley Institute of Living Scale was designed primarily to be used as a brief measure of cognitive functioning and impairment on the basis of differential performance between skills of crystalized intelligence and fluid intelligence (Shipley, 1940). It consisted of Vocabulary and Abstract Reasoning subtests, as Walter Shipley determined that these two areas best represented skill sets reflecting crystalized, premorbid functioning and fluid, post-impairment functioning, respectively. The Shipley was originally standardized on a normative group of 1,016 grade school, high school and college students, and produced scores for Vocabulary, Abstraction, and Conceptual Quotient (CQ, or level of cognitive impairment). Though no major revision was made to the content of the scale, a revised normative group consisting of 290 psychiatric inpatients was introduced in 1970 (Paulson & Lin, 1970), which had a wide distribution across the adult age span, and an even distribution of males, females, and members of different socioeconomic backgrounds. Age-adjusted norm distributions and predicted WAIS and WAIS-R Full Scale IQ scores were also added to the Shipley in 1985 in an effort to keep the measure relevant within the assessment community (Zachary et al., 1985). Despite these efforts to keep the test

viable, the applicability of the Shipley became increasingly questioned as newer measures were developed and established tests, such as the Wechsler series, were continually updated to reflect changing times and national demographics.

As a result of these growing questions about the applicability of the original Shipley and its demonstrated popularity within the psychological and medical community, an effort to revise the Shipley by improving upon the original was initiated, concluding in 2009 (Shipley, Gruber, Martin, & Klein, 2009). Users of the original Shipley reported that, while they were generally satisfied with the functionality of the Shipley as an intellectual screener, having a nonverbal portion and norms for children would increase its overall applicability. With these suggestions in mind, the test developers revised both the Vocabulary and Abstraction scales by updating the content of individual test items, and arranging items to reflect an increasing scale of difficulty that tapped the entire range of intellectual ability. The test developers also created a new task, called the Block Patterns scale, as a nonverbal alternative to the Abstraction scale, since the Abstraction scale seemed to contain a high verbal component that overlapped with the crystallized intelligence domain of the Vocabulary scale. To ensure the validity of the proposed revision, it was administered along with the Wechsler Adult Intelligence Scale, 3rd Edition (WAIS-III) to a group of 165 young adults, and the concurrent validity of the new Block Patterns Scale and the Block Design subtest of the WAIS-III was measured ($r$ = .61).

The final version of the Shipley-2 was standardized against a normative sample of 2,826 participants. This sample consisted of two separate age groups (children ages 7 to 19; adults ages 17 to 89), broadly representative of the demographic characteristics of the

2005 U.S. Census along the factors of gender, race/ethnic background, educational level/socioeconomic status, and U.S. geographic region. From this sample, standard scores were derived for the Vocabulary, Abstraction, and Block Patterns scales; two composite scales of total intellectual functioning (Composite A, based on a Vocabulary/Abstraction administration; and Composite B, based on a Vocabulary/Block Patterns administration); and two impairment indices ascertained through a complex formula that took into account demographic factors and the degree of difference between two sections of the test (AQ, based on Vocabulary/Abstraction; and BQ, based on Vocabulary/Block Patterns). Standard scores were based on a mean of 100 and standard deviation of 15, such that the individual scores would be directly comparable to other modern tests of cognitive ability.

As part of the development process for the Shipley-2, extensive reliability and validity testing was conducted to ensure the applicability and dependability of this new measure of intellectual functioning. Internal consistency reliability, or the extent to which items relate to a common construct, proved to be high among separate samples of adults and children for the Composite scores ($r$ = .88 to .97 among adults; $r$ = .82 to .94 among children), and slightly lower for the individual scales (Vocabulary scale, $r$ = .85 to .92 among adults, $r$ = .81 to .89 among children; Block Patterns, $r$ = .88 to .94 among adults, $r$ = .69 to .94 among children; Abstraction scale, $r$ = .66 to .91 among adults, $r$ = .70 to .80 among children) . An assessment of test-retest reliability among 296 individuals from the standardization group demonstrated similarly high levels of stability of the measures scores over time, with correlation coefficients of .74 to .94 across the sample.

The content validity of the Shipley-2 largely followed from studies conducted on the original Shipley (Phay & York, 1990), as the underlying theory of the Shipley had not changed despite the revision of items. Construct validity, or the accuracy of a test in measuring the underlying construct of crystallized/fluid intelligence, was assessed by interscale correlations, comparing performance to age differences, item-scale correlations, item factor analysis, and an item response analysis to assess the difficulty gradient of each scale. To assess the ability of the Shipley-2 to discriminate individuals with average cognitive ability from those with an intellectual deficiency, a clinical sample of 483 individuals was administered the measure, which resulted in the expectedly lower standard scores, indicating cognitive impairment.

To determine the applicability of the Shipley-2 as a measure of general intelligence and cognitive ability, concurrent validity was assessed by comparing the Shipley-2 to other measures of intellectual ability and academic achievement. In these correlational studies, the Shipley-2 showed moderate to high correlations ($r$ = .45 to .86) with the subtests and scales of the Wechsler Adult Intelligence Scale, 3rd edition (WAIS-III) among 263 adults. A similar comparison among 166 children administered the Wechsler Intelligence Scale for Children, 4th edition (WISC-IV) found a weaker level of correlation to the Shipley-2, with low to moderate correlations of .14 to .69. Moderate to high correlations were found among adults ($r$ = .45 to .77) and among children ($r$ = .39 to .63) taking the Wechsler Abbreviated Scale of Intelligence (WASI, based on the WAIS-III). Similarly, moderate correlations ($r$ = .47 to .64) were achieved among adults administered another brief measure of intelligence, the Wonderlic Personnel Test.

Concurrent validity testing of the original Shipley Institute of Living Scale against other standardized measures of intelligence has been conducted since the original measure's inception, and proved to be a bellwether against which the Shipley continually proved its effectiveness as a brief measure of intellectual functioning. These series of assessments began in 1948, when the original Wechsler-Bellevue scale was used as a comparative test against the original Shipley-Hartford scale (Garfield & Fey, 1948). Since those early days, the Shipley Institute of Living Scale (as it was later known) has been tested and proven itself time and time again as a valid measure of intellectual assessment when compared and correlated with other, proven objective scales, including the Kaufman Brief Intelligence Scale ($r$ = .77 to .83; Bowers & Pantle, 1998), the Raven's Progressive Matrices Scale (Eisenthal & Harford, 1971; Pringle & Haanstad, 1971), the Slosson Intelligence Test ($r$ = .49, Martin, Blair, Sadowski, & Wheeler, 1981; $r$ = .46 to .54, Martin, Blair, Stokes, & Lester, 1977; $r$ = .68, Martin, Blair, & Vickers, 1979), and other varied scales of intellectual ability (Sines & Simmons, 1959; Watson & Klett, 1968; Martin, Blair, & Vickers, 1979; Penn, Jacob, & Brown, 1988; Watson et al., 1992).

Within this history of continual validity testing, the Wechsler series has been a standard against which the Shipley has been consistently weighed and compared in order to prove its meddle as a measure of general intelligence. The initial version of the Shipley showed only a moderate level of correlation ($r$ = .68) with the original Wechsler-Bellevue scale IQ scale, and a weak correlation ($r$ = .13) between the impairment indices of both tests (Garfield & Fey, 1948). However, later testing found at least moderate to high correlations between the Shipley total score and predicted IQ, and the IQ scores of the

original WAIS (Sines & Simmons, 1959; Suinn, 1960). In particular, a study by Wiens and Banaka (1960) found a .80 correlation between the Shipley predicted IQ and WAIS IQ score, while Stone and Ramer (1965) found a similar, .79 correlation. In another study (Prado & Taub, 1966), the examiners found the Shipley to be an even better predictor of average or better functioning than the WAIS and Wechsler-Bellevue, confirming earlier results about the Shipley's good applicability as a rapid screener for intellectual assessment (Prado & Cannon, 1965). Some studies did show poor applicability of the Shipley among certain demographic groups, as Pauker (1975) found the Shipley to overestimate the IQ scores of women and underestimate the IQ scores of men, though these results were never duplicated in other validity studies. Older adults were misidentified as having cognitive impairments more often in a 1985 study (Heinemann, Harper, Friedman, & Whitney, 1985), and the authors also found the unrevised WAIS to overestimate WAIS-R IQ scores. These problems were addressed and reportedly corrected with the 1986 revision of the Shipley normative tables and WAIS-R FSIQ prediction procedures.

Accordingly, a later study by Frisch and Jesop (1989) following the 1986 revision found that, among 34 psychiatric inpatients, the revised Shipley did an acceptable job of predicting WAIS-R IQ scores, which was similarly confirmed by a .72 correlation coefficient between the Shipley and the WAIS-R among another group of inpatients (Hays, Emmons, Wagner, & Stallings, 1997). In regards to more current versions of the WAIS, Villar (2005) found a high level of correlation between Shipley predicted IQ scores and the IQ scores of the Wechsler Abbreviated Scale of Intelligence (WASI), which was derived from the Wechsler Adult Intelligence Scale, 3rd edition (WAIS-III).

Several other studies utilized the WAIS FSIQ scores as a benchmark to test how accurately the Shipley compared to other measures of cognitive assessment. In a comparison of the WAIS, Shipley, and revised Beta examination, Bartz (1968) found a good relationship between the WAIS FSIQ and Shipley total score ($r$ = .78), while the Beta showed a poor relationship with the FSIQ ($r$ = .37). Watson and Klett (1968) confirmed these conclusions in their own study among a group of hospital patients, where the Shipley proved to be a more useful predictor of WAIS FSIQ scores than the Beta exam. All of these studies demonstrated that, despite minimal revision over the last 60+ years, the original Shipley was a valid evaluator of general intellectual functioning and impairment when compared to the standard bearers in this realm of assessment.

**Research Questions**

The purpose of this study was to assess the concurrent validity of the Shipley-2 with the WAIS-IV. Specifically, this study assessed the level of correlation between the Index scores (Verbal Comprehension, Perceptual Reasoning, Working Memory, Processing Speed, and General Ability) and Full Scale IQ score of the WAIS-IV with the three Scale scores (Vocabulary, Abstraction, and Block Design) and two Composite scores of the Shipley-2.

The questions examined in this study were as follows:

1. What is the concurrent validity of the Shipley-2 and the correlation of its scale and composite scores to the indices and Full Scale IQ (FSIQ) score of the WAIS-IV?

2. Based on these results, can the Shipey-2 be considered a viable alternative for quick assessment and screening of cognitive function, in lieu of administering a full WAIS-IV?
3. What are suitable applications of use for the Shipley-2, and what areas may need improvement or further study?

## Method

### Participants

Sites participating in this study included the Office of Disability Services (ODS) at Wright State University and the Ellis Human Development Institute (Ellis) in Dayton, Ohio. Participants were obtained from the clinical population of undergraduate students and local Dayton residents seeking assessment services that utilized the WAIS-IV as part of their individual test batteries. This clinical convenience sample was selected on the basis of ready availability and enrollment in assessment services already being conducted by professional psychology graduate students in a research and practice-oriented clinical setting. Every client that completed a WAIS-IV at these two sites was asked to participate in this study and complete a Shipley-2. Over the course of one year, data from 25 participants was gathered, and though the results as reported in the current study are considered definitive, the study itself will continue to collect data through June 2012.

### Materials

The Shipley-2 was the primary survey instrument in this study. As previously stated, the Shipley-2 is a two-part, brief scale of general intellectual functioning and cognitive deterioration, intended for use with individuals ages 7 to 90. It consists of three subtests, two of which are interchangeable for a given administration, with an administration time of 20 to 25 minutes. The normative group of the Shipley-2 included 2,826 individuals and was demographically representative of the U.S. population on the basis of age, gender, race/ethnic background, U.S. geographic region, and educational

level. A single test administration typically yields two individual scale scores, a composite score (which is comparable to a WAIS FSIQ), and an impairment index score. Internal reliability of the Shipley-2 is high among adult subjects, and compared to other measures of adult intelligence the Shipley has a moderate to high relationship, with a correlation coefficient of .46 to .86 with the WAIS-III and .43 to .74 with the WASI (Shipley, Gruber, Martin, & Klein, 2009). For the purposes of this study, nearly the full range of possible Shipley-2 scores, including the scale scores of Vocabulary, Abstraction, and Block Design, the Composite A and B sum scores were used for the basis of correlational analysis. The AQ and BQ Impairment Index scores were omitted from the final analysis due to their lack of corresponding equivalents on the WAIS-IV, as well as a lack of necessary demographic information needed to accurately compute them.

The Wechsler Adult Intelligence Scale, 4th edition (WAIS-IV) was used to determine the comparative Full Scale IQ score of each participant. The WAIS-IV was developed in 2008 as an update to the WAIS-III, retaining the four-factor structure and much of the content of its predecessor while updating subtests and scoring procedures. It consists of 10 standard subtests and 5 supplemental subtests administered individually to adults ages 16 to 90, and yields four index scores, a Full Scale IQ (FSIQ) score, and a General Ability score. The normative group of the WAIS-IV included 2,200 individuals and was demographically representative of the U.S. population from the 2005 Census on the basis of age, gender, ethnicity, geographic region, and education. Internal consistency is above average to high ($r$ = .71 to .96) for the individual subtests, but very high for the index scores ($r$ = .87 to .98) and Full Scale IQ ($r$ = .97 to .98). There is also a high correlation between the WAIS-IV and the Wechsler Individual Achievement Test, 2nd

edition (Composite scores, $r$ = .65 to .88; Subtest scores, $r$ = .42 to .80), and with the previous edition of the WAIS (Composite scores, $r$ = .59 to .82; Subtest scores, $r$ = .33 to .81) (Wechsler, 2008). Of the 21 possible standard scores from the WAIS-IV, only the primary ten subtests, four Index Scores (Verbal Comprehension, Perceptual Reasoning, Working Memory, and Processing Speed), the General Ability Index score, and the Full Scale IQ score were used for the purpose of correlational analysis.

A demographic information questionnaire (see Appendix A) was used to record the individual factors of age, ethnicity, gender, and educational level of each participant, as these have been determined to be primary moderating variables for past versions of the Shipley (Phay, 1990). The Statistical Package for the Social Sciences (SPSS) software application was used to compute descriptive statistics, reliability coefficients, correlations, and regression equations.

**Procedure**

A clinical sample of students and adult clients who sought assessment services at the Office of Disability Services at Wright State University and the Assessment Clinic at the Ellis Human Development Institute were asked to participate in this study. Clients were selected on the basis of age (over 18 years old), having a referral question that necessitated administration of the WAIS-IV, and a lack of severe mental illness or distress. Every client who met these criteria was asked to participate. The testing clinician gave a brief explanation of the project to each client and shared the Consent for Participation in Research form (see Appendix B). Clients who agreed to complete the Shipley were asked to sign one copy of the consent form; they were encouraged to take with them a second copy of the consent form for their own records. Administration of

the Shipley occurred at any time over the course of several client appointments as part of their individual assessment and clinical care. To ensure confidentiality, all participants that choose to participate were assigned a random number which was used solely for the purpose of data collection and organization, and is not reflected in the results. As an additional layer of security and confidentiality, keys that tied random subject numbers to client case numbers, as well as relevant case documentation and test protocols, were kept by supervising psychologists at each of the participating test sites. The test researcher for this study only saw the demographic questionnaire and aggregate test data for each participating volunteer, as summarized on a standardized data form for each participant (see Appendix C).

Administration of the test measures began in February 2011 following approval of the study by the Dissertation Committee and Internal Review Board (IRB) at Wright State University. Though individual test data were accumulated on an individual, case-by-case basis, the final results reflect the sum correlational information for the preliminary subject pool as a whole, and do not reflect the performance of individual participants. For the purposes of accumulating the most amount of potentially illuminating data, all three sections of the Shipley-2 (Vocabulary, Abstraction, and Block Design) were administered to participating subjects. This format allowed all potential Shipley-2 scores to be compared to the WAIS-IV in order to thoroughly ascertain the Shipley's level of correlation with the standard bearer of intellectual assessment. For similar reasons of standardization, only administrations that utilized at least the standard 10 subtests of the WAIS-IV, and were not prorated, were used for the basis of test score correlational analysis.

## Results

Data were gathered from a sample of 25 participants from both participating sites (see Tables 1.1 – 1.6). Of this sample, 10 participants were between 18-25 years old, 5 between 26-30, 6 between 31-40, 2 between 41-50, and 2 were between 61-70. Fourteen of the participants were female and 11 were male; 8 participants identified themselves as Black/African-American and 17 as White; and 22 of the participants were from the Ellis Institute while 3 were from ODS. In terms of level of education, 16 of the participants had "Some college," 5 had "Less than high school," 3 had a High school diploma or GED, and 1 participant had a graduate degree. Reasons for referral to diagnostic testing included ADHD/Attention issues (5 participants), Learning Disorder evaluation (16 participants), Mental Retardation evaluation (1 participant), Social Security Disability Insurance qualification (1 participant), Personality testing (1 participant), and a non-specified referral (1 participant). A number of subjects at both testing facilities declined to participate in the study, primarily because (by report) of the increased time that the extra administration of the Shipley-2 would have added to their assessment batteries.

Two-tailed, Pearson correlation coefficients for the aggregate results of the Shipley-2 and WAIS-IV scores were calculated through the use of the SPSS statistical software package. Standard scores that were correlated included the Index scores, General Ability Index (GAI), and Full Scale IQ (FSIQ) from the WAIS-IV, and the Vocabulary, Abstraction, Block Design, and Composite scores (A and B) from the Shipley-2 (see Table 2). Similarly, the 10 primary subtests from the WAIS-IV were also

correlated to the Scale and Composite scores from the Shipley-2 (see Table 3). Data for this latter analysis were only readily available for 22 of the participants at the time of this publication.

**WAIS-IV Indices and FSIQ to Shipley-2 Scores**

As can be seen in Table 2, highly significant correlations (p = .01) were detected between the WAIS-IV FSIQ and all 5 Shipley-2 scores (*r* = .549 to .807), with the highest levels of correlation occurring between the FSIQ and the Shipley-2 Vocabulary (*r* = .807) and Composite B (*r* = .806) standard scores. Similarly, the WAIS-IV GAI had highly significant correlations with all of the Shipley-2 scores (*r* = .554 to .843), with the highest correlations again occurring with the Vocabulary (*r* = .843) and Composite B (*r* = .838) scores.

The WAIS-IV Index scores showed a greater level of variation in their levels of correlation with the Shipley-2. The VCI had the strongest level of correlation with the Shipley-2, and highly significant levels of correlation were detected with the Vocabulary (*r* = .847), Abstraction (*r* = .581). Composite A (*r* = .771), and Composite B (*r* = .777) scores. Notably, the VCI demonstrated a distinctively lower level of correlation (p = .05) with the Shipley-2 Block Patterns scale (*r* = .423). A similar range of high correlations was detected between the WAIS-IV WMI and the Shipley-2 Vocabulary (*r* = .755), Abstraction (*r* = .661), Composite A (*r* = .760), and Composite B (*r* = .720) scores, while a moderate level of correlation (p = .05) was detected between the WMI and Shipley-2 Block Patterns scale (*r* = .439). The PRI was shown to have a more modest relationship with the Shipley-2, with highly significant levels of correlation to Vocabulary (*r* = .687), Abstraction (*r* = .576), Block Patterns (*r* = .638), Composite A (*r* = .676), and Composite

B (*r* = .754) scores. The PSI demonstrated the weakest relationship to the Shipley-2, as it had only moderately significant correlations to Vocabulary (*r* = .446), Block Patterns (*r* = .436), and Composite A (*r* = .459) scores (*r* = .509), as well as a minimal relationship to the Shipley-2 Abstraction scale (*r* = .384). However, a high correlation was detected between the WAIS-IV PSI and the Shipley-2 Composite B (*r* = .514) standard score.

**Shipley-2 Scores to WAIS-IV Subtests**

As outlined in Table 3, the WAIS-IV primary subtests showed a highly varied relationship to the Shipley-2. Of the possible scores from the Shipley-2, the Vocabulary scale showed the strongest levels of correlation with the various WAIS-IV subtests (*r* = .239 to .770), and predictably the highest correlations (p = .01) were detected between this scale and the Vocabulary (*r* = .770), Information (*r* = .763), and Similarities (*r* = .750) subtests from the WAIS-IV Verbal Comprehension Index. Other high correlations for the Shipley-2 Vocabulary scale included Block Design (*r* = .591), Visual Puzzles (*r* = .612), Digit Span (*r* = .661), and Arithmetic (*r* = .647). The weakest correlations to the Vocabulary scale occurred with the WAIS-IV Matrix Reasoning (*r* = .514, p = .05), Symbol Search (*r* = .239), and Coding (*r* = .400) subtests.

The Shipley-2 Abstraction scale showed a more even relationship with the WAIS-IV subtests (*r* = .323 to .646), with the highest correlations (p = .01) occurring between this scale and the Digit Span (*r* = .646), Information (*r* = .589), Matrix Reasoning (*r* = .568), Visual Puzzles (*r* = .560), and Similarities (*r* = .553) subtests from the WAIS-IV. The newly developed Block Patterns scale from the Shipley-2 demonstrated the weakest relationship to the WAIS-IV subtests (*r* = .186 to .585), with the highest correlation occurring with the Visual Puzzles subtest, while a moderate level of correlation (p = .05)

was detected between the Block Patterns scale and Matrix Reasoning ($r$ = .474). Both of the Shipley-2 Composite scores demonstrated high levels of correlation (p = .01) with nearly all of the primary ten WAIS-IV subtests (Composite A: $r$ = .297 to .708; Composite B: $r$ = .259 to .702), save for the Symbol Search and Coding subtests, where only low (Composite A: $r$ = .297; Composite B: $r$ = .259) or moderate (Composite A: $r$ = .451; Composite B: $r$ = .466) levels of correlation were detected respectively.

**Regression Analyses**

In order to determine how well the different scores from the Shipley-2 predict the FSIQ and GAI for the WAIS-IV, four multiple regression analyses were calculated based on the relationship of these WAIS-IV scores to the Shipley-2 scale scores (Vocabulary, Abstraction, and Block Patterns) and to the composite scores (Composites A and B).

The multiple regression of Shipley-2 scale scores to WAIS-IV FSIQ had a highly significant level of correlation between the independent variables (Vocabulary, Abstraction, and Block Patterns) and the dependent variable (FSIQ), with a highly significant level of the variability between the sets accounted for (R = .824; $R^2$ = .679) The predictive equation from this data was calculated to be as follows:

$$\hat{y}(\text{WAIS-IV FSIQ}) = .488(\text{Vocabulary}) + .026(\text{Abstraction}) + .220(\text{Block Patterns}) + 21.045. \quad (1)$$

The multiple regression of Shipley-2 composite scores to WAIS-IV FSIQ had a slightly lower, but similarly highly significant level of correlation and high level of accounted variability between the predictor variables (Composite A and B) and WAIS-IV FSIQ (R = .812; $R^2$ = .660). The predictive equation from this data was calculated to be as follows:

$$\hat{y}(\text{WAIS-IV FSIQ}) = .190(\text{Composite A}) + .484(\text{Composite B}) + 28.003. \quad (2)$$

The multiple regression of Shipley-2 scale scores to WAIS-IV GAI had a highly significant level of correlation between the independent variables (Vocabulary, Abstraction, and Block Patterns) and the dependent variable (GAI), with a highly significant level of the variability between the sets accounted for ($R = .857$; $R^2 = .734$) The predictive equation from this data was calculated to be as follows:

$$\hat{y}(\text{WAIS-IV GAI}) = .569(\text{Vocabulary}) - .055(\text{Abstraction}) + .222(\text{Block Patterns}) + 22.247. \quad (3)$$

As with the WAIS-IV FSIQ, the multiple regression of Shipley-2 composite scores to the GAI had a slightly lower, but similarly highly significant level of correlation and high level of accounted variability between the predictor variables (Composite A and B) and WAIS-IV FSIQ ($R = .833$; $R^2 = .694$). The predictive equation from this data was calculated to be as follows:

$$\hat{y}(\text{WAIS-IV GAI}) = .138(\text{Composite A}) + .571(\text{Composite B}) + 26.544. \quad (4)$$

## Discussion

Based on the current test findings, the Shipley-2 does indeed have a good level of concurrent validity with the WAIS-IV, and can be considered a predictive measure of an actual WAIS-IV Full Scale IQ (Equations 1 and 2) and Global Ability Index score (Equations 3 and 4). In addition, the Shipley-2 does seem to reasonably assess the domains of cognitive function it hopes to measure. This construct validity can be observed through the strong level of relationship between the Verbal components of the WAIS-IV (VCI, WMI, Similarities, Vocabulary, Information, Digit Span, Arithmetic) and those of the Shipley-2 (Vocabulary, Composite A and B), and the reduced relationship between verbally-based aspects of the WAIS-IV and the non-verbal, performance-based aspects of the Shipley (Abstraction, Block Patterns). Though there also exists a high level of relationship between the WAIS-IV PRI and more "performance-based" components of the Shipley-2 (Abstraction, Block Patterns, Composite B), the small difference between these correlations and the equally significant correlations between the PRI and verbal aspects of the Shipley-2 (Vocabulary, Composite A) suggest that the Shipley-2 does not as adequately differentiate or measure non-verbal cognitive processing. In addition, processing speed does not seem to be strongly assessed by the Shipley-2 based on the minimal to moderate levels of correlation between the Shipley-2 and the WAIS-IV PSI, despite the fact that the Shipley-2 is also a timed test. The experience of the examiners in this study was that nearly all participants were able to complete the Shipley-2 subtests within time limits.

In terms of answering the second and third questions for this study, an in-depth analysis of each individual aggregate correlation shows that, while overall the Shipley-2 may be considered a valid alternative for quick screening and assessment of cognitive functioning, it does not necessarily do as well as a measure of individual cognitive abilities outside of the verbal/crystallized intelligence domain. Because of this fact, and as the test developers themselves recommend, the Shipley-2 most likely cannot be considered a substitute for a more thorough cognitive assessment measure such as the WAIS-IV (based on the current findings). However, as a quick measure of overall cognitive ability, potential impairment, and vocabulary-based crystallized cognitive skills, as well as a predictor of full intellectual ability (Equations 1 through 4), the Shipley-2 does an exceptionally good job.

**Implications**

Accordingly, the Shipley-2 would likely be best utilized in settings where a quick assessment of overall cognitive ability is necessary, perhaps as part of the standard intake package at any mental health service, college counseling center or medical center. Other settings where a Shipley-2 may be useful include human resource evaluators, school special education programs, and social work organizations. By using the Shipley-2 as a quick gauge of intellectual functioning, psychologists and other mental health providers will be able to efficiently note and track cognitive ability over time. They may also be able to see early on if more in-depth assessment is warranted for clients on the basis of their individual Shipley-2 scores. Given that all of the participants in this study were clinical subjects undergoing assessment of their cognitive abilities (such that a WAIS-IV

was needed), it can be concluded that the Shipley-2 may be well suited for use in a clinical setting in particular.

Thus, utilizing a Shipley-2 as part of a standard screening routine may help to indicate that a more-depth assessment is necessary, though the ability of the Shipley-2 to gauge "normal" cognitive ability (as opposed to ability that is already under question) will first have to be more conclusively established. For instance, suppose that individuals seeking mental health or counseling services for stress caused by poor occupational or academic performance received low composite scores on their Shipley-2 as part of their intake package. As a result, a referral to more in-depth assessment may be made in order to diagnostically clarify if a particular cognitive and/or emotional issue is contributing to their poor performance, and what appropriate treatment and/or remedial options would be. Without the Shipley-2 in place from the very start of services, these clients may have gone much longer without having their underlying issue identified and effectively managed and treated.

**Limitations of the Study**

The results of this study were certainly hindered by the small sample of participants that was assessed. The final sample size possibly was due in part to two unexpected factors that developed over the course of the study. First, the participating sites reported that the vast majority of potential participants chose to opt out from contributing to the study. The primary reason given was a desire to avoid extra testing or time needed to complete a given assessment battery. Given that potential participants were all outpatient clients undergoing psychological testing, it is highly likely that the presentation of extra, potentially unnecessary testing was unattractive from an economic

and time standpoint, as it would have added an additional 30 minutes to what may have already been lengthy appointments. As such, it may be better in the future to schedule a separate time to take the Shipley-2, only introduce the Shipley-2 in cases of relatively brief assessment batteries, or offer some form of incentive for participation.

Another unexpected development was the relative scarcity of participants at the Office of Disability Services (ODS), particularly when compared to the Ellis Institute. Given that psychological testing is typically conducted year-round at this site, and that students may be under less time pressure than adults at an outpatient facility such as the Ellis Institute, it was difficult to ascertain why so little subject data emerged from this site. In speaking with the site supervisor, it was later determined that WAIS-IV's were only given during half of the training year, which prevented the site from obtaining participants for the majority of the initial testing period. Additional feedback suggested that test administrators at the site were confused as to when and how they should solicit potential participants, despite being provided specific instructions, communications, and contact information with the study developer. These test administrators also happened to be graduate psychology students with generally less experience in assessment, and thus reportedly they may have felt more reluctance towards the added responsibility of administering an optional cognitive test than more experienced administrators may have. As such, any follow-up that utilizes outside assessment sites would do well to have a very thorough and deep level of communication not only with the site supervisor, but also with participating staff to ensure the study is being actively and aggressively pursued over the course of normal business.

Regardless of the reasons for the small size of the sample, the fact that it was relatively small may have allowed uncontrollable individual differences to cover more primary effects. These individual distinctions are likely magnified within this small-sample study, as well as by the fact that the individual test administrations were conducted by a large set of participating psychology trainees and staff psychologists at the two participating test locations. A follow-up to this study would do well to control for these individual experiential variables by utilizing a larger, more demographically diverse sample of participants, controlling for environmental variables of time and fatigue at participating testing locations, and keeping the number of contributing assessors to a minimum to ensure continuity and consistency for the full set of test administrations.

Additionally, the fact that the current study consists solely of adult, clinical subjects means that the results cannot necessarily be generalized to the wider population that the Shipley-2 has been indicated for by the test developers. For instance, in order to create the current convenience sample, it was necessary to omit anyone below the age of 18, which means that the applicability of the Shipley-2 towards adolescents and young adults cannot be confirmed. A future study may do well to include a sub-sample of children and young adults along with a comparison of their Shipley-2 scores to the most current edition of the Wechsler Intelligence Scale for Children (WISC) or Woodcock-Johnson (WJ). Additionally, any future study should control for a mix of clinical and non-clinical, "normal intelligence" participants in order to allow for the widest range of potential results and a more conclusive assessment of the potential applicability of the Shipley-2 as a test of intellectual ability and potential use as a cognitive screening tool. Assembling a sample of participants in this way would also allow the study to assess how

well the Shipley-2 fairs in its estimation of intellectual performance at the very high and very low ends of cognitive ability, as this was a historically noted weakness of the original Shipley Institute of Living Scale.

**Future Areas of Research**

In addition to constructing a more controlled and inclusive follow-up study, another potential avenue for investigation may be to assess how well the Shipley-2 can be utilized as a measure of pre-morbid intellectual functioning. Given that the results of the study demonstrated a strong level of correlation between the crystallized intelligence-based Vocabulary subtest and the WAIS-IV FSIQ, it may be assumed that the Shipley-2 may be useful as a gauge of premorbid functioning, which is often associated more strongly with the crystallized intelligence domain. Future researchers may do well to conduct a similar concurrent validity study between the Shipley-2 and more established measures of pre-morbid functioning, and should the Shipley-2 prove to be a capable gauge of pre-morbid intelligence, it would open a whole new area of usage in the growing assessment of traumatic brain injury and rehabilitative medical care.

In a similar vein, researchers may wish to evaluate the potential use of the Shipley-2 as a measure of adaptive functioning, again given the strong level of association between the Vocabulary subtest from the Shipley-2 and nearly all of the various cognitive skills of the WAIS-IV, as well as the fact that the Shipley-2 is not reliant on processing speed or motor dexterity. A correlational analysis between the Shipley-2 and measures such as the Vineland Adaptive Behavior Scales may demonstrate that a Shipley-2 Vocabulary or Composite score associates strongly with an overall level of adaptive functioning. If this proves to be case, then the Shipley-2 may be indicated for

use as a quick measure of adaptive functioning in rehabilitative care as well as forensic assessment settings.

More research is also needed on potential uses for the new Block Patterns scale. Of all three Shipley-2 scales, it demonstrated the weakest level of correlation with intellectual ability, and particularly with the more "performance-oriented," fluid aspects of the WAIS-IV that it was designed to assess. However, the Block Patterns scale's moderate level of correlation with the WAIS-IV Visual Puzzles and Matrix Reasoning subtests may indicate that this scale taps more specifically into the skill of visuo-spatial problem solving instead of into a broader range of fluid intellectual skills. Additionally, the two-part nature of this scale may result in differential performance on the basis of inability to perceive a "rule change," much like the Wisconsin Card Sorting Task. As such, the Shipley-2 Block Patterns scale could potentially be compared with other neuropsychological tests of executive functioning in order to ascertain its potential usefulness as a quick gauge of performance in this regard and with populations in need of quick or brief neuropsychological testing.

In conclusion, the current results contribute greatly to beginning research on the validity of this new, revised and restandardized version of the original Shipley Institute of Living Scale, as well as to the long history of validity testing on this time-tested measure of intellectual functioning. As with past validity research studies on both the original Shipley and this new version, this investigation confirmed that the Shipley-2 does have a significant level of correlation with the current standard bearer of intellectual assessment, the WAIS-IV, and likely measures much of the same cognitive construct in a more efficient and easily used package. Because the original Shipley Institute of Living Scale

was used so pervasively as a quick gauge of general intelligence, these preliminary results should make adopters of the newest version of the Shipley satisfied that they are getting a solid gauge of overall cognitive ability to use with their clients. Still, if the Shipley is to continue as a primary tool in the arsenal of cognitive assessors, a healthy skepticism and continued look at its validity is not only warranted, but an ethical and statistical necessity.

## Appendix A

## Tables

Table A1

*Participant Characteristics*

| Age | | | | | | | |
|---|---|---|---|---|---|---|---|
| 18-25 | 26-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 | 81-89 |
| 10 | 5 | 6 | 2 | 0 | 2 | 0 | 0 |

| Gender | | Location of Testing | |
|---|---|---|---|
| Male | Female | Ellis | ODS |
| 11 | 14 | 22 | 3 |

| Ethnicity | | | | | |
|---|---|---|---|---|---|
| Asian | Black/African-American | Hispanic/ Latino | Native American | Native Hawaiian/ Pacific Islander | White |
| 0 | 8 | 0 | 0 | 0 | 17 |

| Level of Education | | | | | | |
|---|---|---|---|---|---|---|
| Less than High School | High School/ GED | Some College | Associate's Degree | Trade/ Professional Degree | Undergraduate degree | Graduate degree |
| 5 | 3 | 16 | 0 | 0 | 0 | 1 |

| Reason for Referral | | | | | |
|---|---|---|---|---|---|
| ADHD/ Attention | Learning Disorder (LD) | Mental Retardation (MR) | Social Security Disability (SSDI) | Personality Testing | Not specified |
| 5 | 16 | 1 | 1 | 1 | 1 |

Table A2

*Correlation Coefficients of WAIS-IV Indices and FSIQ with the Shipley-2*

| | FSIQ | GAI | VCI | PRI | WMI | PSI | Voc. | Abs. | BP | C-A | C-B |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FSIQ | 1 | .982** | .927** | .884** | .926** | .768** | .807** | .634** | .549** | .778** | .806** |
| GAI | .982** | 1 | .944** | .902** | .876** | .683** | .843** | .621** | .554** | .789** | .830** |
| VCI | .927** | .944** | 1 | .712** | .878** | .571** | .847** | .581** | .423* | .771** | .777** |
| PRI | .884** | .902** | .712** | 1 | .727** | .707** | .687** | .576** | .638** | .676** | .754** |
| WMI | .926** | .876** | .878** | .727** | 1 | .614** | .755** | .661** | .439* | .760** | .720** |
| PSI | .768** | .683** | .571** | .707** | .614** | 1 | .446* | .384 | .436* | .459* | .514** |
| Voc. | .807** | .843** | .847** | .687** | .755** | .446* | 1 | .740** | .506** | .944** | .927** |
| Abs. | .634** | .621** | .581** | .576** | .661** | .384 | .740** | 1 | .502* | .915** | .744** |
| BP | .549** | .554** | .423* | .638** | .439* | .436* | .506** | .502* | 1 | .559** | .790** |
| C-A | .778** | .789** | .771** | .676** | .760** | .459* | .944** | .915** | .559** | 1 | .914** |
| C-B | .806** | .830** | .777** | .754** | .720** | .514** | .927** | .744** | .790** | .914** | 1 |

*Note.* FSIQ = WAIS-IV Full Scale IQ; GAI = WAIS-IV Global Ability Index; VCI = WAIS-IV Verbal Comprehension Index; PRI = WAIS-IV Perceptual Reasoning Index; WMI = WAIS-IV Working Memory Index; PSI = WAIS-IV Processing Speed Index; Voc. = Shipley-2 Vocabulary scale; Abs. = Shipley-2 Abstraction scale; BP = Shipley-2 Block Patterns scale; C-A = Shipley-2 Composite A index; C-B = Shipley-2 Composite B index.

** = correlation is significant at the 0.01 level; * = correlation is significant at the 0.05 level

Table A3

*Correlation Coefficients of WAIS-IV Subtests with the Shipley-2*

| | Si | Vo | In | BD | MR | VP | DS | Ar | SS | Cd | Voc | Abs | BP | C-A | C-B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Si | 1 | .848** | .716** | .494* | .432* | .578** | .585** | .844** | .514* | .301 | .750** | .553** | .346 | .708** | .702** |
| Vo | .848** | 1 | .711** | .646** | .477* | .522* | .552** | .760** | .272 | .307 | .770** | .522* | .255 | .689** | .670** |
| In | .716** | .711** | 1 | .412 | .526* | .641** | .657** | .856** | .414 | .410 | .763** | .589** | .260 | .707** | .666** |
| BD | .494* | .646** | .412 | 1 | .648** | .570** | .514* | .510* | .416 | .511* | .591** | .511* | .408 | .588** | .603** |
| MR | .432* | .477* | .526* | .648** | 1 | .481* | .599** | .619** | .505* | .514* | .514* | .568** | .474* | .566** | .571** |
| VP | .578** | .522* | .641** | .570** | .481* | 1 | .331 | .611** | .533* | .385 | .612** | .560** | .585** | .611** | .689** |
| DS | .585** | .552** | .657** | .514* | .599** | .331 | 1 | .573** | .494* | .457* | .661** | .646** | .232 | .691** | .582** |
| Ar | .844** | .760** | .856** | .510* | .619** | .611** | .573** | 1 | .577** | .308 | .647** | .456* | .230 | .589** | .572** |
| SS | .514* | .272 | .414 | .416 | .505* | .533* | .494* | .577** | 1 | .329 | .239 | .323 | .186 | .297 | .259 |
| Cd | .301 | .307 | .410 | .511* | .514* | .385 | .457* | .308 | .329 | 1 | .400 | .460* | .394 | .451* | .466* |
| Voc. | .750** | .770** | .763** | .591** | .514* | .612** | .661** | .647** | .239 | .400 | 1 | .740** | .506** | .944** | .927** |
| Abs. | .553** | .522** | .589** | .511* | .568** | .560** | .646** | .456** | .323 | .460* | .740** | 1 | .502* | .915** | .744** |
| BP | .346 | .255 | .260 | .408 | .474* | .585** | .232 | .230 | .186 | .394 | .506** | .502* | 1 | .559** | .790** |
| C-A | .708** | .689** | .707** | .588** | .566** | .611** | .691** | .589** | .297 | .451* | .944** | .915** | .559** | 1 | .914** |
| C-B | .702** | .670** | .666** | .603** | .571** | .689** | .582** | .572** | .259 | .466* | .927** | .744** | .790** | .914** | 1 |

*Note.* Si = WAIS-IV Similarities subtest; Vo = WAIS-IV Vocabulary subtest; In = WAIS-IV Information subtest; BD = WAIS-IV Block Design subtest; MR = WAIS-IV Matrix Reasoning subtest; VP = WAIS-IV Visual Puzzles subtest; DS = WAIS-IV Digit Span subtest; Ar = WAIS-IV Arithmetic subtest; SS = WAIS-IV Symbol Search subtest; Cd = WAIS-IV Coding subtest; Voc. = Shipley-2 Vocabulary scale; Abs. = Shipley-2 Abstraction scale; BP = Shipley-2 Block Patterns scale; C-A = Shipley-2 Composite A index; C-B = Shipley-2 Composite B index.

** = correlation is significant at the 0.01 level; * = correlation is significant at the 0.05 level

## Appendix B

## Demographic Information Questionnaire

(Please note, your information will **not** be given to outside entities. It is for internal use only)

1. Client number assigned for research: _____
2. Age: _____
3. Gender (circle one): Female Male
4. Education level (circle one): Less than high school High school graduate/GED
   Some College Associate's degree Trade/Professional degree
   Undergraduate degree Graduate degree
5. Race/Ethnicity (circle one): Asian Black/African American Hispanic/Latino Native American
   Native Hawaiian/Pacific Islander
   White
6. Location of psychological testing (circle one): Office of Disability Services
   Ellis Institute
7. Reason for referral for testing:
   _____
   _____

## Appendix C

## CONSENT FOR PARTICIPATION IN RESEARCH

### The Concurrent Validity of the Shipley-2 and WAIS-IV

### A. PURPOSE AND BACKGROUND

**John K. Lodge, Psy.M., in the School of Professional Psychology, is conducting a research study to help understand the validity of the Shipley-2 as a measure of intellectual functioning when compared to the WAIS-IV. I am being asked to participate in this study because I am a healthy volunteer and that I am seeking assessment services at a site participating in this study.**

### B. PROCEDURES

If I agree to be in the study, the following will happen:

1. Health Information: In the course of this study, the researchers will gather information about me by reviewing my assessment referral question. This information will be used to decide if I am eligible for the study. The information also will be used to find out the relationship between my scores on two different tests of intellectual functioning. The information to be gathered will include non-identifying demographic information, reason for assessment referral or location of testing, and results from diagnostic testing. If I choose not to sign this consent form, the investigator cannot use information from my testing and/or medical records and I cannot participate in this research study.

2. As a participant in this study, I will be asked to complete a demographic questionnaire and a test of intellectual functioning (Shipley-2), and allow results from my diagnostic testing (WAIS-IV, Shipley-2 and demographic questionnaire) to be submitted to the Primary Investigator of this study for aggregate analysis. My name will not be attached to any documentation used in this study, my original test protocols will remain in my case file at my testing location, and my results will be assigned a random number to ensure confidentiality and secrecy.

It is estimated that the completion of the research demographic questionnaire and the Shipley-2 tests will take approximately 25 minutes. This is in addition to the time required in the clinic to complete the WAIS-IV test (which is done as part of my routine care). All testing will be done at my clinic location.

### C. RISKS/DISCOMFORTS

Some of the difficult questions may produce unpleasant feelings or a level of personal unease, but I will be able to stop at any time if I feel too uncomfortable.

## D. CONFIDENTIALITY

Participation in research may involve a loss of privacy, but information about me will be handled as confidentially as possible. The researcher, John K. Lodge, will only have access to some information about me, namely the results of my testing and my demographic information. Representatives from the sites participating in this study and the Wright State University Institutional Review Board also may review or receive information about me. My name will not be used in any published reports about this study.

Keeping Study Records: John K. Lodge will retain my research records, including information from my medical records, for at least six years or until the study is completed (whichever is longer). However, my personal health information cannot be used for additional research without additional approval from me.

## E. BENEFITS

There will be no direct benefit to me from participating in this study. However, the information that I provide may help health professionals better understand how well the Shipley-2 and WAIS-IV perform as measures of intellectual functioning.

## F. COSTS

There will be no costs to me as a result of taking part in this study.

## G. QUESTIONS

If I have questions about this research study, or have a research-related injury to report, I can contact the researcher John K. Lodge at lodge.4@wright.edu. If I have general questions about giving consent or my rights as a research participant in this research study, I can call the Wright State University Institutional Review Board at 937-775-4462. If I would like a copy of the group (not individual) results of this study, I can contact John K. Lodge. It is estimated that these results will be available on or after 6/30/2012.

## I. CONSENT

I will be given a copy of this consent form to keep.

PARTICIPATION IN RESEARCH IS VOLUNTARY. I am free to decline to be in this study, or to withdraw from it at any point. My decision as to whether or not to participate in this study will have no influence on my present or future status as a client.

I may also withdraw my authorization (consent) for this study to use my personal health information by contacting John K. Lodge to inform him of my decision. If I withdraw my authorization, the information already collected may continue to be used, to maintain the integrity of the study.

If I agree to participate I should sign below.

| | |
|---|---|
| Date | Signature of Study Participant |
| Date | Signature of Person Obtaining Consent |

## Appendix D

### WAIS-IV/Shipley-2 Data Form

(Site Name)

| **WAIS-IV Scores**: | **Standard Scores** | **Client #:_____** |
|---|---|---|
| Full Scale IQ Score | | |
| General Ability Index | | |
| Verbal Comprehension Index | | |
| Similarities | | |
| Vocabulary | | |
| Information | | |
| (Comprehension) | | |
| Perceptual Reasoning Index | | |
| Block Design | | |
| Matrix Reasoning | | |
| Visual puzzles | | |
| (Figure Weights) | | |
| (Picture Completion) | | |
| Working Memory | | |
| Digit Span | | |
| Arithmetic | | |
| (Letter-Number Seq) | | |
| Processing Speed | | |
| Symbol Search | | |
| Coding | | |
| (Cancellation) | | |

| **Shipley-2** | **Raw Scores** | **Standard Scores** |
|---|---|---|
| Vocabulary | | |
| Abstraction | | |
| Block Patterns | | |

---

*[To be completed by researcher]*

| | | |
|---|---|---|
| Composite A | | |
| Composite B | | |
| AQ Impairment Index | | |
| BQ Impairment Index | | |

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